

## SEQUENCE LISTING

<110> Novartis Forschungsstiftung, Zweigniederlassung Friedrich Miescher  
Institute for Biomedical Research

<120> Gene for increased somatic recombination

<130> 1-32546B

<160> 30

<170> PatentIn version 3.1

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<211> 4524

<212> DNA

<213> Arabidopsis thaliana

<220>

<221> CDS

<222> (1)..(4524)

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Lys Ala 1055	Val Thr Arg Met Leu 1060	Leu Met Pro Ser Lys 1065	Val Glu Thr	
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&lt;211&gt; 1507

&lt;212&gt; PRT

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Gln Gly Gly Val Val Ala Asn Tyr Ser Asn Gly Ser Lys Ser Arg Met  
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 Arg Ser Met Leu Gly Glu His Val Gln Lys Phe Lys Asn Arg Ser Lys  
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<211> 458

<212> PRT

<213> Arabidopsis thaliana

<400> 5

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Gly ile Pro ile Lys Leu Ala Ala Gly Phe Val Gly Gln Leu Glu Ala  
                   35                  40                  45

Arg Glu Ala Ala Gly Leu Val Val Asp Met ile Lys Gln Lys Lys Met  
                   50                  55                  60

Ala Gly Lys Ala Leu Leu Leu Ala Gly Pro Pro Gly Thr Gly Lys Thr  
 65                  70                  75                  80

Ala Leu Ala Leu Gly ile Ser Gln Glu Leu Gly Ser Lys Val Pro Phe  
                   85                  90                  95

Cys Pro Met Val Gly Ser Glu Val Tyr Ser Ser Glu Val Lys Lys Thr  
                   100                  105                  110

Glu Val Leu Met Glu Asn Phe Arg Arg Ala ile Gly Leu Arg ile Lys  
                   115                  120                  125

Glu Thr Lys Glu Val Tyr Glu Gly Glu Val Thr Glu Leu Ser Pro Glu  
                   130                  135                  140

Glu Thr Glu Ser Leu Thr Gly Gly Tyr Gly Lys Ser ile Ser His Val  
 145                  150                  155                  160

Val ile Thr Leu Lys Thr Val Lys Gly Thr Lys His Leu Lys Leu Asp

	165		170		175
Pro Thr Ile Tyr	Asp Ala Leu Ile Lys	Glu Lys Val Ala Val	Gly Asp		
	180	185	190		
Val Ile Tyr Ile	Glu Ala Asn Ser	Gly Ala Val Lys Arg	Val Gly Arg		
	195	200	205		
Ser Asp Ala Phe	Ala Thr Glu Phe	Asp Leu Glu Ala	Glu Glu Tyr Val		
	210	215	220		
Pro Leu Pro Lys	Gly Glu Val His	Lys Lys Lys	Glu Ile Val Gln	Asp	
	225	230	235	240	
Val Thr Leu Gln	Asp Leu Asp Ala	Ala Asn Ala Arg	Pro Gln Gly	Gly	
	245	250	255		
Gln Asp Ile Leu	Ser Leu Met Gly	Gln Met Met Lys	Pro Arg Lys	Thr	
	260	265	270		
Glu Ile Thr Asp	Lys Leu Arg Gln	Glu Ile Asn Lys	Val Val Asn	Arg	
	275	280	285		
Tyr Ile Asp Glu	Gly Val Ala Glu	Leu Val Pro Gly	Val Leu Phe	Ile	
	290	295	300		
Asp Glu Val His	Met Leu Asp Met	Glu Cys Phe Ser	Tyr Leu Asn	Arg	
	305	310	315	320	
Ala Leu Glu Ser	Ser Leu Ser Pro	Ile Val Ile Phe	Ala Thr Asn	Arg	
	325	330	335		
Gly Val Cys Asn	Val Arg Gly Thr	Asp Met Pro Ser	Pro His Gly	Val	
	340	345	350		
Pro Ile Asp Leu	Leu Asp Arg Leu	Val Ile Ile Arg	Thr Gln Ile	Tyr	
	355	360	365		
Asp Pro Ser Glu	Met Ile Gln Ile	Ile Ala Ile Arg	Ala Gln Val	Glu	
	370	375	380		
Glu Leu Thr Val	Asp Glu Glu Cys	Leu Val Leu Leu	Gly Glu Ile	Gly	
	385	390	395	400	
Gln Arg Thr Ser	Leu Arg His Ala	Val Gln Leu Leu	Ser Pro Ala	Ser	
	405	410	415		
Ile Val Ala Lys	Met Asn Gly Arg	Asp Asn Ile Cys	Lys Ala Asp	Ile	
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Glu Glu Val Thr Ser Leu Tyr Leu Asp Ala Lys Ser Ser Ala Lys Leu  
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Leu His Glu Gln Gln Glu Lys Tyr Ile Ser  
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<210> 6

<211> 1584

<212> DNA

<213> Arabidopsis thaliana

<220>

<221> CDS

<222> (1)..(1410)

<223>

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 cga atc ggc gca cac tca cac atc aga gga cta ggt ctc gac tct gcc 96  
 Arg Ile Gly Ala His Ser His Ile Arg Gly Leu Gly Leu Asp Ser Ala  
 20 25 30  
 ctc gag ccg cga gct gtt tcc gaa ggt atg gtc ggt caa gtg aag gcg 144  
 Leu Glu Pro Arg Ala Val Ser Glu Gly Met Val Gly Gln Val Lys Ala  
 35 40 45  
 cgt aaa gcc gcc ggt gta atc ctt cag atg att aga gaa ggg aaa atc 192  
 Arg Lys Ala Ala Gly Val Ile Leu Gln Met Ile Arg Glu Gly Lys Ile  
 50 55 60  
 gcg ggt cgg gct att cta ata gcg ggt caa ccc gga acg ggt aag aca 240  
 Ala Gly Arg Ala Ile Leu Ile Ala Gly Gln Pro Gly Thr Gly Lys Thr  
 65 70 75 80  
 gcg att gca atg ggt atg gcg aaa tct ctt ggc ttg gaa act cct ttt 288  
 Ala Ile Ala Met Gly Met Ala Lys Ser Leu Gly Leu Glu Thr Pro Phe  
 85 90 95  
 gcg atg att gca gga agt gaa att ttc tca tta gag atg tca aag aca 336  
 Ala Met Ile Ala Gly Ser Glu Ile Phe Ser Leu Glu Met Ser Lys Thr  
 100 105 110  
 gaa gct ttg act cag tct ttt cgt aaa gcg att ggt gtt agg atc aaa 384  
 Glu Ala Leu Thr Gln Ser Phe Arg Lys Ala Ile Gly Val Arg Ile Lys  
 115 120 125  
 gaa gag aca gag gtt att gaa gga gaa gtt gtt gag gtt cag att gat 432  
 Glu Glu Thr Glu Val Ile Glu Gly Glu Val Val Glu Val Gln Ile Asp  
 130 135 140

agg Arg 145	cct Pro	gct Ala	tct Ser	tct Ser	ggg Gly 150	gtt Val	gct Ala	tcc Ser	aag Lys	tca Ser 155	ggg Gly	aag Lys	atg Met	act Thr	atg Met 160	480
aaa Lys	acg Thr	act Thr	gat Asp	atg Met 165	gaa Glu	act Thr	gtg Val	tat Tyr	gat Asp 170	atg Met	gga Gly	gct Ala	aag Lys	atg Met 175	att Ile	528
gag Glu	gct Ala	ttg Leu	aac Asn 180	aag Lys	gag Glu	aaa Lys	gtg Val	cag Gln 185	agt Ser	ggg Gly	gat Asp	gtt Val	att Ile 190	gcc Ala	att Ile	576
gat Asp	aaa Lys	gct Ala 195	act Thr	ggg Gly	aag Lys	att Ile	act Thr 200	aag Lys	ctt Leu	gga Gly	aga Arg	tcg Ser 205	ttt Phe	tcg Ser	agg Arg	624
tct Ser	cgt Arg 210	gat Asp	tat Tyr	gat Asp	gct Ala	atg Met 215	ggg Gly	gcg Ala	cag Gln	acc Thr	aag Lys 220	ttt Phe	gtg Val	cag Gln	tgc Cys	672
cct Pro 225	gaa Glu	ggg Gly	gag Glu	ttg Leu	cag Gln 230	aag Lys	agg Arg	aaa Lys	gag Glu	gtt Val 235	gta Val	cat His	tgt Cys	gtc Val	act Thr 240	720
ctt Leu	cac His	gag Glu	att Ile	gat Asp 245	gtt Val	atc Ile	aac Asn	agc Ser	agg Arg 250	aca Thr	caa Gln	ggg Gly	ttt Phe	ctt Leu 255	gcc Ala	768
ctt Leu	ttc Phe	act Thr	ggc Gly 260	gat Asp	act Thr	gga Gly	gaa Glu	atc Ile 265	cga Arg	tca Ser	gaa Glu	gtc Val	cgg Arg 270	gaa Glu	caa Gln	816
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gtt Val	ccc Pro 290	gga Gly	gtt Val	ctc Leu	ttc Phe	att Ile 295	gat Asp	gaa Glu	gtc Val	cac His	atg Met 300	ctc Leu	gac Asp	atc Ile	gaa Glu	912
tgc Cys 305	ttc Phe	tca Ser	ttc Phe	ctt Leu	aac Asn 310	cga Arg	gct Ala	cta Leu	gaa Glu	aac Asn 315	gaa Glu	atg Met	tca Ser	cca Pro	atc Ile 320	960
ctt Leu	gtg Val	gtg Val	gca Ala	aca Thr 325	aac Asn	cga Arg	gga Gly	gtg Val	acg Thr 330	aca Thr	atc Ile	cgt Arg	ggc Gly	aca Thr 335	aac Asn	1008
cag Gln	aaa Lys	tca Ser	cca Pro 340	cac His	ggg Gly	atc Ile	ccg Pro	att Ile 345	gat Asp	ctc Leu	ctt Leu	gac Asp	cgt Arg 350	ctt Leu	ctc Leu	1056
atc Ile	atc Ile	act Thr 355	acc Thr	caa Gln	cct Pro	tac Tyr	aca Thr 360	gac Asp	gat Asp	gac Asp	ata Ile	agg Arg 365	aag Lys	ata Ile	tta Leu	1104
gaa Glu	atc Ile 370	cgt Arg	tgc Cys	caa Gln	gag Glu	gaa Glu 375	gac Asp	gtt Val	gag Glu	atg Met	aac Asn 380	gaa Glu	gag Glu	gcc Ala	aaa Lys	1152
cag Gln 385	ctt Leu	ttg Leu	aca Thr	ttg Leu	atc Ile 390	gga Gly	cgt Arg	gat Asp	aca Thr	tct Ser 395	cta Leu	agg Arg	tat Tyr	gcg Ala	att Ile 400	1200
cat His	ctt Leu	ata Ile	acc Thr	gca Ala	gct Ala	gca Ala	ttg Leu	tca Ser	tgc Cys	cag Gln	aaa Lys	cgg Arg	aaa Lys	ggg Gly	aaa Lys	1248

405								410				415				
gtc	gtg	gag	gtt	gag	gat	att	cag	aga	ggt	tac	aga	ctg	ttc	ttg	gat	1296
Val	Val	Glu	Val	Glu	Asp	Ile	Gln	Arg	Val	Tyr	Arg	Leu	Phe	Leu	Asp	
			420					425					430			
gtg	agg	aga	tcg	atg	cag	tat	ctt	ggt	gag	tat	cag	agt	cag	tat	atg	1344
Val	Arg	Arg	Ser	Met	Gln	Tyr	Leu	Val	Glu	Tyr	Gln	Ser	Gln	Tyr	Met	
		435					440					445				
ttc	agt	gaa	cca	atc	aaa	aac	gat	gaa	gct	gct	gca	gaa	gac	gaa	caa	1392
Phe	Ser	Glu	Pro	Ile	Lys	Asn	Asp	Glu	Ala	Ala	Ala	Glu	Asp	Glu	Gln	
	450					455					460					
gat	gct	atg	cag	atc	tga	ggatccacct	ctgtttgcct	tatttatcat								1440
Asp	Ala	Met	Gln	Ile												
465																
gtttcgtggt	gatatgtatg	attaggatgt	tgaactcgga	tttatgtttt	ttttttttta											1500
agttgtgacg	agattcggtt	ctagaaaatg	atttaaccaa	gttcaataca	gatcggtttg											1560
gtacaaaaca	aaaaaaaaaa	aaaa														1584

&lt;210&gt; 7

&lt;211&gt; 469

&lt;212&gt; PRT

&lt;213&gt; Arabidopsis thaliana

&lt;400&gt; 7

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Arg	Ile	Gly	Ala	His	Ser	His	Ile	Arg	Gly	Leu	Gly	Leu	Asp	Ser	Ala	
			20					25					30			
Leu	Glu	Pro	Arg	Ala	Val	Ser	Glu	Gly	Met	Val	Gly	Gln	Val	Lys	Ala	
		35					40					45				
Arg	Lys	Ala	Ala	Gly	Val	Ile	Leu	Gln	Met	Ile	Arg	Glu	Gly	Lys	Ile	
	50					55					60					
Ala	Gly	Arg	Ala	Ile	Leu	Ile	Ala	Gly	Gln	Pro	Gly	Thr	Gly	Lys	Thr	
65					70				75						80	
Ala	Ile	Ala	Met	Gly	Met	Ala	Lys	Ser	Leu	Gly	Leu	Glu	Thr	Pro	Phe	
			85						90					95		
Ala	Met	Ile	Ala	Gly	Ser	Glu	Ile	Phe	Ser	Leu	Glu	Met	Ser	Lys	Thr	
			100					105					110			
Glu	Ala	Leu	Thr	Gln	Ser	Phe	Arg	Lys	Ala	Ile	Gly	Val	Arg	Ile	Lys	

Glu Ile Arg Cys Gln Glu Glu Asp Val Glu Met Asn Glu Glu Ala Lys  
370 375 380

Gln Leu Leu Thr Leu Ile Gly Arg Asp Thr Ser Leu Arg Tyr Ala Ile  
385 390 395 400

His Leu Ile Thr Ala Ala Ala Leu Ser Cys Gln Lys Arg Lys Gly Lys  
405 410 415

Val Val Glu Val Glu Asp Ile Gln Arg Val Tyr Arg Leu Phe Leu Asp  
420 425 430

Val Arg Arg Ser Met Gln Tyr Leu Val Glu Tyr Gln Ser Gln Tyr Met  
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Phe Ser Glu Pro Ile Lys Asn Asp Glu Ala Ala Ala Glu Asp Glu Gln  
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Asp Ala Met Gln Ile  
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<211> 1422

<212> DNA

<213> Arabidopsis thaliana

<220>

<221> CDS

<222> (64)..(1389)

<223>

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1 Ser His Ile Arg Gly Leu Gly Leu Asp Ser Val Leu Glu Pro Arg 15  
gcc gta tcc gaa gga atg gtt ggt caa atc aaa gca cgt aaa gcc gcc 156  
Ala Val Ser Glu Gly Met Val Gly Gln Ile Lys Ala Arg Lys Ala Ala 20 25 30  
gga gta acc ctc gag ttg atc aga gac ggc aaa atc tcg ggt cgg gct 204  
Gly Val Thr Leu Glu Leu Ile Arg Asp Gly Lys Ile Ser 35 40 45  
ata ctt ata gcg ggt caa ccc gga acg ggt aaa atc gca ata gca atg 252  
Ile Leu Ile Ala Gly Gln Pro Gly Thr Gly Lys Ile Ala Ile Ala Met 50 55 60  
ggt ata gca aaa tca ctt gga caa gaa aca cca ttc act atg att gca 300  
Gly Ile Ala Lys Ser Leu Gly Gln Glu Thr Pro Phe Thr Met Ile Ala



65	70	75	
gga agt gag atc ttt tct tta gag atg tca aag act gaa gct tta act Gly Ser Glu Ile Phe Ser Leu Glu Met Ser Lys Thr Glu Ala Leu Thr 80 85 90 95			348
caa gct ttt cgt aaa gct att ggt gtt agg atc aaa gaa gag act gac Gln Ala Phe Arg Lys Ala Ile Gly Val Arg Ile Lys Glu Glu Thr Asp 100 105 110			396
gtg ata gaa gga gaa gtt gtg acg att tcg att gat aga cct gct tct Val Ile Glu Gly Glu Val Val Thr Ile Ser Ile Asp Arg Pro Ala Ser 115 120 125			444
tct ggt ggt tct gtg aag aag act ggg aag ata aca atg aag acg act Ser Gly Gly Ser Val Lys Lys Thr Gly Lys Ile Thr Met Lys Thr Thr 130 135 140			492
gat atg gaa tct aat ttt gat ttg gga tgg aaa ttg att gag cca ttg Asp Met Glu Ser Asn Phe Asp Leu Gly Trp Lys Leu Ile Glu Pro Leu 145 150 155			540
gat aag gag aaa gta cag agt ggt gat gtt att gtt ttg gat agg ttt Asp Lys Glu Lys Val Gln Ser Gly Asp Val Ile Val Leu Asp Arg Phe 160 165 170 175			588
tgt ggg aag att act aag ctt gga aga tct ttt acg agg tct aga gat Cys Gly Lys Ile Thr Lys Leu Gly Arg Ser Phe Thr Arg Ser Arg Asp 180 185 190			636
ttt gat gtt atg ggt tca aag act aag ttt gtg cag tgc cct gaa ggt Phe Asp Val Met Gly Ser Lys Thr Lys Phe Val Gln Cys Pro Glu Gly 195 200 205			684
gag ctt gag aag agg aag gag gtt ttg cat tct gtc aca ctt cat gag Glu Leu Glu Lys Arg Lys Glu Val Leu His Ser Val Thr Leu His Glu 210 215 220			732
att gat gtt att aat agc agg act caa ggg tat cta gcc ctc ttc aca Ile Asp Val Ile Asn Ser Arg Thr Gln Gly Tyr Leu Ala Leu Phe Thr 225 230 235			780
ggt gat aca ggc gag att cgt tca gaa acc cga gag caa agc gat act Gly Asp Thr Gly Glu Ile Arg Ser Glu Thr Arg Glu Gln Ser Asp Thr 240 245 250 255			828
aaa gtg gca gag tgg aga gaa gaa ggg aaa gct gaa ata gta cct ggt Lys Val Ala Glu Trp Arg Glu Glu Gly Lys Ala Glu Ile Val Pro Gly 260 265 270			876
gtt ctc ttc att gat gaa gtc cat atg ctt gat atc gaa tgc ttc tct Val Leu Phe Ile Asp Glu Val His Met Leu Asp Ile Glu Cys Phe Ser 275 280 285			924
ttc ctg aat aga gct ctc gaa aac gat atg tca cca atc ctg gtc gtg Phe Leu Asn Arg Ala Leu Glu Asn Asp Met Ser Pro Ile Leu Val Val 290 295 300			972
gct aca aac aga gga atg aca aca atc cga gga aca aac cag ata tca Ala Thr Asn Arg Gly Met Thr Thr Ile Arg Gly Thr Asn Gln Ile Ser 305 310 315			1020
gca cat ggg atc cca atc gat ttt ctt gac cgt ctt ctt att atc aca Ala His Gly Ile Pro Ile Asp Phe Leu Asp Arg Leu Leu Ile Ile Thr 320 325 330 335			1068

aca cag cct tac aca caa gac gag atc aga aat att tta gag atc cgt 1116  
 Thr Gln Pro Tyr Thr Gln Asp Glu Ile Arg Asn Ile Leu Glu Ile Arg  
 340 345 350  
 tgc caa gaa gag gat gtg gag atg aac gag gaa gcg aaa cag ctt ctg 1164  
 Cys Gln Glu Glu Asp Val Glu Met Asn Glu Glu Ala Lys Gln Leu Leu  
 355 360 365  
 act ttg atc gga tgt aat acc tcg ctt agg tac gcg att cat cta atc 1212  
 Thr Leu Ile Gly Cys Asn Thr Ser Leu Arg Tyr Ala Ile His Leu Ile  
 370 375 380  
 aat gca gct gcc cta gct tgc ctg aaa cgt aaa ggg aaa gtc gta gag 1260  
 Asn Ala Ala Ala Leu Ala Cys Leu Lys Arg Lys Gly Lys Val Val Glu  
 385 390 395  
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 400 405 410 415  
 tcg atg cag tac ttg gtt gag cat gag agc gag tac ttg ttt agc gtg 1356  
 Ser Met Gln Tyr Leu Val Glu His Glu Ser Glu Tyr Leu Phe Ser Val  
 420 425 430  
 cct ata aaa aac aca cag gag gct act gca gga gaagaaacag aacacgaggc 1409  
 Pro Ile Lys Asn Thr Gln Glu Ala Thr Ala Gly  
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 catggaagtt tga 1422

&lt;210&gt; 9

&lt;211&gt; 442

&lt;212&gt; PRT

&lt;213&gt; Arabidopsis thaliana

&lt;400&gt; 9

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 20 25 30

Val Thr Leu Glu Leu Ile Arg Asp Gly Lys Ile Ser Gly Arg Ala Ile  
 35 40 45

Leu Ile Ala Gly Gln Pro Gly Thr Gly Lys Ile Ala Ile Ala Met Gly  
 50 55 60

Ile Ala Lys Ser Leu Gly Gln Glu Thr Pro Phe Thr Met Ile Ala Gly  
 65 70 75 80

Ser Glu Ile Phe Ser Leu Glu Met Ser Lys Thr Glu Ala Leu Thr Gln  
 85 90 95

Ala Phe Arg Lys Ala Ile Gly Val Arg Ile Lys Glu Glu Thr Asp Val  
 100 105 110  
 Ile Glu Gly Glu Val Val Thr Ile Ser Ile Asp Arg Pro Ala Ser Ser  
 115 120 125  
 Gly Gly Ser Val Lys Lys Thr Gly Lys Ile Thr Met Lys Thr Thr Asp  
 130 135 140  
 Met Glu Ser Asn Phe Asp Leu Gly Trp Lys Leu Ile Glu Pro Leu Asp  
 145 150 155 160  
 Lys Glu Lys Val Gln Ser Gly Asp Val Ile Val Leu Asp Arg Phe Cys  
 165 170 175  
 Gly Lys Ile Thr Lys Leu Gly Arg Ser Phe Thr Arg Ser Arg Asp Phe  
 180 185 190  
 Asp Val Met Gly Ser Lys Thr Lys Phe Val Gln Cys Pro Glu Gly Glu  
 195 200 205  
 Leu Glu Lys Arg Lys Glu Val Leu His Ser Val Thr Leu His Glu Ile  
 210 215 220  
 Asp Val Ile Asn Ser Arg Thr Gln Gly Tyr Leu Ala Leu Phe Thr Gly  
 225 230 235 240  
 Asp Thr Gly Glu Ile Arg Ser Glu Thr Arg Glu Gln Ser Asp Thr Lys  
 245 250 255  
 Val Ala Glu Trp Arg Glu Glu Gly Lys Ala Glu Ile Val Pro Gly Val  
 260 265 270  
 Leu Phe Ile Asp Glu Val His Met Leu Asp Ile Glu Cys Phe Ser Phe  
 275 280 285  
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 290 295 300  
 Thr Asn Arg Gly Met Thr Thr Ile Arg Gly Thr Asn Gln Ile Ser Ala  
 305 310 315 320  
 His Gly Ile Pro Ile Asp Phe Leu Asp Arg Leu Leu Ile Ile Thr Thr  
 325 330 335  
 Gln Pro Tyr Thr Gln Asp Glu Ile Arg Asn Ile Leu Glu Ile Arg Cys  
 340 345 350  
 Gln Glu Glu Asp Val Glu Met Asn Glu Glu Ala Lys Gln Leu Leu Thr

355                      360                      365  
 Leu Ile Gly Cys Asn Thr Ser Leu Arg Tyr Ala Ile His Leu Ile Asn  
       370                      375                      380  
 Ala Ala Ala Leu Ala Cys Leu Lys Arg Lys Gly Lys Val Val Glu Ile  
       385                      390                      395                      400  
 Gln Asp Ile Glu Arg Val Tyr Arg Leu Phe Leu Asp Thr Lys Arg Ser  
                               405                      410                      415  
 Met Gln Tyr Leu Val Glu His Glu Ser Glu Tyr Leu Phe Ser Val Pro  
                               420                      425                      430  
 Ile Lys Asn Thr Gln Glu Ala Thr Ala Gly  
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&lt;210&gt; 10

&lt;211&gt; 1591

&lt;212&gt; DNA

&lt;213&gt; Arabidopsis thaliana

&lt;400&gt; 10

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agacacttgg tgtttcctat attcgagttc cttcaagagc gtcagcttta ccctgatgag      180
cagatcctga agtctaaaat ccagcttttg aaccagacga acatgggttg ttacgccatg      240
gatattcaca agagtctcta ccacactgaa gacgctcctc aagaaatggg ggagagaaga      300
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ctgtgctcta accttgagag gagtttgagt gccttggtgg gaaagctcgc atctgaaata      600
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gggtctgtata tcttttttaa ccatgataat ggaaggacac agatcattga tctttttaac      780
caagacaagt atctgaatgc catccaaact agtgctccac acttgctgcg ctacttggca      840
actgctttca ttgtcaacaa aaggagaaga ccacaattga aagaattcat taaggtcatt      900
cagcaagagc actactccta caaagatcca attatcgagt tcctggcatg tgtgtttgtc      960

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attttgtaaa aaaaaaaaaa aaaaaaaaaa a 1591

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&lt;210&gt; 11

&lt;211&gt; 1773

&lt;212&gt; DNA

<213> *Arabidopsis thaliana*

&lt;220&gt;

&lt;221&gt; CDS

&lt;222&gt; (1)..(1773)

&lt;223&gt;

&lt;400&gt; 11

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1 5 10 15

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gga gtc gat gct gct ttc agc tac aaa tac aat caa cta cat gga att 96
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20 25 30

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tgt aaa aaa gat gga att gtt ctc tgt cct gga ttc acg aca aca cac 144
Cys Lys Lys Asp Gly Ile Val Leu Cys Pro Gly Phe Thr Thr Thr His
35 40 45

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Ser Ile Pro Phe Val Asp Gly Glu Pro Ile Tyr Lys Gly Ser Ser Arg
50 55 60

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act aac att ggt gga tat cat gtc act gat tat tta aag cag ctt ctg 240
Thr Asn Ile Gly Gly Tyr His Val Thr Asp Tyr Leu Lys Gln Leu Leu
65 70 75 80

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tca ctt aag tac cct ttt cat tcg tct agg ttt aca tgg gag aag gcc 288
Ser Leu Lys Tyr Pro Phe His Ser Ser Arg Phe Thr Trp Glu Lys Ala

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85						90						95						
gaa Glu	gat Asp	ttg Leu	aaa Lys 100	ttg Leu	gaa Glu	cac His	tgt Cys	tat Tyr 105	atc Ile	gca Ala	cct Pro	gac Asp	tat Tyr 110	gct Ala	tcg Ser	336		
gaa Glu	att Ile	cgg Arg 115	tta Leu	ttc Phe	cag Gln	gaa Glu	gga Gly 120	aga Arg	aaa Lys	gaa Glu	gct Ala	gaa Glu 125	gag Glu	aaa Lys	aca Thr	384		
agt Ser	tat Tyr 130	tgg Trp	cag Gln	ctt Leu	cca Pro	tgg Trp 135	ata Ile	cct Pro	cct Pro	ccc Pro	acc Thr 140	gaa Glu	gtt Val	cct Pro	cca Pro	432		
tca Ser 145	gaa Glu	gaa Glu	gag Glu	att Ile	gca Ala 150	agg Arg	aag Lys	gca Ala	gct Ala	ata Ile 155	aga Arg	gaa Glu	aaa Lys	caa Gln	ggc Gly 160	480		
caa Gln	agg Arg	ctg Leu	cga Arg	gaa Glu 165	atg Met	gct Ala	gaa Glu	gca Ala	aag Lys 170	aga Arg	gtg Val	tcc Ser	aag Lys	att Ile 175	aat Asn	528		
gac Asp	atg Met	gag Glu	aat Asn 180	caa Gln	ctg Leu	att Ile	agc Ser	ttg Leu 185	cgt Arg	ttc Phe	ctt Leu	ttg Leu	aag Lys 190	caa Gln	gtt Val	576		
gac Asp	cag Gln	gtt Val 195	gaa Glu	gag Glu	gat Asp	gat Asp	att Ile 200	cca Pro	acc Thr	ttt Phe	ttg Leu	tca Ser 205	gac Asp	acc Thr	ggc Gly	624		
tac Tyr	gcg Ala 210	tcc Ser	agg Arg	caa Gln	gag Glu	cta Leu 215	gag Glu	tct Ser	act Thr	att Ile	acg Thr 220	aaa Lys	gtg Val	aca Thr	cag Gln	672		
tcg Ser 225	ctt Leu	aga Arg	aaa Lys	gca Ala	agg Arg 230	ggc Gly	gag Glu	ccg Pro	aag Lys	aat Asn 235	gaa Glu	cca Pro	gct Ala	gag Glu	tat Tyr 240	720		
gaa Glu	gaa Glu	aac Asn	cct Pro	gat Asp 245	tct Ser	ctt Leu	aat Asn	aat Asn	gaa Glu 250	aag Lys	tat Tyr	cca Pro	ctt Leu	atg Met 255	aat Asn	768		
gtc Val	ccc Pro	gat Asp	gat Asp 260	att Ile	ctt Leu	act Thr	cct Pro	gag Glu 265	cag Gln	ctt Leu	aag Lys	gac Asp	aag Lys 270	aag Lys	agg Arg	816		
caa Gln	atg Met	ttt Phe 275	ctt Leu	aaa Lys	aca Thr	aca Thr	gca Ala 280	gag Glu	ggc Gly	cgg Arg	cta Leu	cga Arg 285	gct Ala	aga Arg	caa Gln	864		
aag Lys	cgt Arg 290	aat Asn	gag Glu	gag Glu	gaa Glu	ctc Leu 295	gaa Glu	aaa Lys	gag Glu	aaa Lys	aga Arg 300	aat Asn	caa Gln	tta Leu	gag Glu	912		
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gct Ala	cag Gln	tac Tyr	aag Lys	gaa Glu 325	gtg Val	ttg Leu	gag Glu	aga Arg	gtt Val 330	gag Glu	cag Gln	aag Lys	aag Lys	cgt Arg 335	ctg Leu	1008		
aaa Lys	aca Thr	aac Asn	ggg Gly 340	tcc Ser	agt Ser	aac Asn	ggg Gly	aat Asn 345	aac Asn	aag Lys	tct Ser	gga Gly	ggc Gly 350	att Ile	ggg Gly	1056		

cga	ggc	gag	cga	ctc	agt	gct	gca	cag	agg	gag	aga	atg	cgt	ctg	ctg	1104
Arg	Gly	Glu	Arg	Leu	Ser	Ala	Ala	Gln	Arg	Glu	Arg	Met	Arg	Leu	Leu	
		355					360					365				
acg	aca	gca	gcc	ttt	gat	aga	ggg	aaa	ggc	gag	gat	acg	ttt	ggt	tct	1152
Thr	Thr	Ala	Ala	Phe	Asp	Arg	Gly	Lys	Gly	Glu	Asp	Thr	Phe	Gly	Ser	
	370					375					380					
aga	gat	gaa	gat	tgg	cag	ctc	tac	aaa	ctt	atg	agc	aag	gat	aat	gac	1200
Arg	Asp	Glu	Asp	Trp	Gln	Leu	Tyr	Lys	Leu	Met	Ser	Lys	Asp	Asn	Asp	
385					390					395					400	
gat	gat	gac	gaa	caa	cct	gat	tca	gac	gag	gca	gag	ttg	gct	cgt	tta	1248
Asp	Asp	Asp	Glu	Gln	Pro	Asp	Ser	Asp	Glu	Ala	Glu	Leu	Ala	Arg	Leu	
				405					410					415		
tca	tct	aga	ctt	cag	gaa	att	gat	cca	aca	ttt	gtg	cag	aaa	gta	gaa	1296
Ser	Ser	Arg	Leu	Gln	Glu	Ile	Asp	Pro	Thr	Phe	Val	Gln	Lys	Val	Glu	
			420					425					430			
gga	gaa	ttg	agt	cag	aca	tca	ggg	gag	gtg	cca	cgc	gta	cgc	cca	tta	1344
Gly	Glu	Leu	Ser	Gln	Thr	Ser	Gly	Glu	Val	Pro	Arg	Val	Arg	Pro	Leu	
		435					440					445				
aca	gag	gaa	gac	tac	aag	ata	gtg	att	ggt	ata	gaa	aga	ttc	cgt	tgc	1392
Thr	Glu	Glu	Asp	Tyr	Lys	Ile	Val	Ile	Gly	Ile	Glu	Arg	Phe	Arg	Cys	
	450					455					460					
cca	gag	atc	ctg	ttc	cat	cca	aac	ctt	att	ggt	att	gac	caa	gta	ggc	1440
Pro	Glu	Ile	Leu	Phe	His	Pro	Asn	Leu	Ile	Gly	Ile	Asp	Gln	Val	Gly	
465					470					475					480	
tta	gac	gag	atg	gct	ggc	aca	tca	atc	aga	agg	cta	ccg	cac	gac	gag	1488
Leu	Asp	Glu	Met	Ala	Gly	Thr	Ser	Ile	Arg	Arg	Leu	Pro	His	Asp	Glu	
				485					490					495		
aaa	gag	tta	gag	gag	agg	cta	acg	agc	tcg	ata	cta	atg	acg	ggc	ggg	1536
Lys	Glu	Leu	Glu	Glu	Arg	Leu	Thr	Ser	Ser	Ile	Leu	Met	Thr	Gly	Gly	
			500					505					510			
tgt	agc	ctt	ctt	cca	ggg	atg	aac	gag	cgg	ttg	gaa	tgt	ggg	att	agg	1584
Cys	Ser	Leu	Leu	Pro	Gly	Met	Asn	Glu	Arg	Leu	Glu	Cys	Gly	Ile	Arg	
		515				520						525				
atg	ata	aga	cct	tgc	gga	tca	ccc	att	aac	gtg	gtt	aga	gct	atg	gat	1632
Met	Ile	Arg	Pro	Cys	Gly	Ser	Pro	Ile	Asn	Val	Val	Arg	Ala	Met	Asp	
	530					535					540					
cca	gtg	ctg	gat	gca	tgg	cga	gga	gca	tct	gca	ttt	gct	gct	aat	ttg	1680
Pro	Val	Leu	Asp	Ala	Trp	Arg	Gly	Ala	Ser	Ala	Phe	Ala	Ala	Asn	Leu	
545					550					555					560	
aac	ttc	ttg	ggg	aat	gcc	ttt	act	aag	atg	gat	tac	gac	gag	aaa	ggt	1728
Asn	Phe	Leu	Gly	Asn	Ala	Phe	Thr	Lys	Met	Asp	Tyr	Asp	Glu	Lys	Gly	
				565					570					575		
gaa	gat	tgg	ctt	aga	aat	tat	caa	att	cga	tac	aac	tat	ttg	tga		1773
Glu	Asp	Trp	Leu	Arg	Asn	Tyr	Gln	Ile	Arg	Tyr	Asn	Tyr	Leu			
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&lt;210&gt; 12

&lt;211&gt; 590

&lt;212&gt; PRT

&lt;213&gt; Arabidopsis thaliana

&lt;400&gt; 12

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Gly Val Asp Ala Ala Phe Ser Tyr Lys Tyr Asn Gln Leu His Gly Ile  
 20 25 30

Cys Lys Lys Asp Gly Ile Val Leu Cys Pro Gly Phe Thr Thr Thr His  
 35 40 45

Ser Ile Pro Phe Val Asp Gly Glu Pro Ile Tyr Lys Gly Ser Ser Arg  
 50 55 60

Thr Asn Ile Gly Gly Tyr His Val Thr Asp Tyr Leu Lys Gln Leu Leu  
 65 70 75 80

Ser Leu Lys Tyr Pro Phe His Ser Ser Arg Phe Thr Trp Glu Lys Ala  
 85 90 95

Glu Asp Leu Lys Leu Glu His Cys Tyr Ile Ala Pro Asp Tyr Ala Ser  
 100 105 110

Glu Ile Arg Leu Phe Gln Glu Gly Arg Lys Glu Ala Glu Glu Lys Thr  
 115 120 125

Ser Tyr Trp Gln Leu Pro Trp Ile Pro Pro Pro Thr Glu Val Pro Pro  
 130 135 140

Ser Glu Glu Glu Ile Ala Arg Lys Ala Ala Ile Arg Glu Lys Gln Gly  
 145 150 155 160

Gln Arg Leu Arg Glu Met Ala Glu Ala Lys Arg Val Ser Lys Ile Asn  
 165 170 175

Asp Met Glu Asn Gln Leu Ile Ser Leu Arg Phe Leu Leu Lys Gln Val  
 180 185 190

Asp Gln Val Glu Glu Asp Asp Ile Pro Thr Phe Leu Ser Asp Thr Gly  
 195 200 205

Tyr Ala Ser Arg Gln Glu Leu Glu Ser Thr Ile Thr Lys Val Thr Gln  
 210 215 220

Ser Leu Arg Lys Ala Arg Gly Glu Pro Lys Asn Glu Pro Ala Glu Tyr  
 225 230 235 240



Glu Glu Asn Pro Asp Ser Leu Asn Asn Glu Lys Tyr Pro Leu Met Asn  
 245 250 255  
 Val Pro Asp Asp Ile Leu Thr Pro Glu Gln Leu Lys Asp Lys Lys Arg  
 260 270  
 Gln Met Phe Leu Lys Thr Thr Ala Glu Gly Arg Leu Arg Ala Arg Gln  
 275 280 285  
 Lys Arg Asn Glu Glu Glu Leu Glu Lys Glu Lys Arg Asn Gln Leu Glu  
 290 295 300  
 Glu Glu Arg Arg Arg Glu Asn Pro Glu Ser Tyr Leu Glu Glu Leu Gln  
 305 310 315 320  
 Ala Gln Tyr Lys Glu Val Leu Glu Arg Val Glu Gln Lys Lys Arg Leu  
 325 330 335  
 Lys Thr Asn Gly Ser Ser Asn Gly Asn Asn Lys Ser Gly Gly Ile Gly  
 340 345 350  
 Arg Gly Glu Arg Leu Ser Ala Ala Gln Arg Glu Arg Met Arg Leu Leu  
 355 360 365  
 Thr Thr Ala Ala Phe Asp Arg Gly Lys Gly Glu Asp Thr Phe Gly Ser  
 370 375 380  
 Arg Asp Glu Asp Trp Gln Leu Tyr Lys Leu Met Ser Lys Asp Asn Asp  
 385 390 395 400  
 Asp Asp Asp Glu Gln Pro Asp Ser Asp Glu Ala Glu Leu Ala Arg Leu  
 405 410 415  
 Ser Ser Arg Leu Gln Glu Ile Asp Pro Thr Phe Val Gln Lys Val Glu  
 420 425 430  
 Gly Glu Leu Ser Gln Thr Ser Gly Glu Val Pro Arg Val Arg Pro Leu  
 435 440 445  
 Thr Glu Glu Asp Tyr Lys Ile Val Ile Gly Ile Glu Arg Phe Arg Cys  
 450 455 460  
 Pro Glu Ile Leu Phe His Pro Asn Leu Ile Gly Ile Asp Gln Val Gly  
 465 470 475 480  
 Leu Asp Glu Met Ala Gly Thr Ser Ile Arg Arg Leu Pro His Asp Glu  
 485 490 495

Lys Glu Leu Glu Glu Arg Leu Thr Ser Ser Ile Leu Met Thr Gly Gly  
 500 505 510  
 Cys Ser Leu Leu Pro Gly Met Asn Glu Arg Leu Glu Cys Gly Ile Arg  
 515 520 525  
 Met Ile Arg Pro Cys Gly Ser Pro Ile Asn Val Val Arg Ala Met Asp  
 530 535 540  
 Pro Val Leu Asp Ala Trp Arg Gly Ala Ser Ala Phe Ala Ala Asn Leu  
 545 550 555 560  
 Asn Phe Leu Gly Asn Ala Phe Thr Lys Met Asp Tyr Asp Glu Lys Gly  
 565 570 575  
 Glu Asp Trp Leu Arg Asn Tyr Gln Ile Arg Tyr Asn Tyr Leu  
 580 585 590

&lt;210&gt; 13

&lt;211&gt; 1416

&lt;212&gt; DNA

&lt;213&gt; Arabidopsis thaliana

&lt;220&gt;

&lt;221&gt; CDS

&lt;222&gt; (1)..(1416)

&lt;223&gt;

&lt;400&gt; 13

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 Met Ile Leu Lys Lys Val Trp Gly Ser Val Trp Asn Arg Ser Asn Ser  
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ggc aag gat ttg gtg aat cat cag aga gcg atc gat gtt cct cct ctg 96  
 Gly Lys Asp Leu Val Asn His Gln Arg Ala Ile Asp Val Pro Pro Leu  
 20 25 30

tta ttg tct tct tca tcg tct ctt ggt gcg ttt gat cag cta ccg atg 144  
 Leu Leu Ser Ser Ser Ser Ser Leu Gly Ala Phe Asp Gln Leu Pro Met  
 35 40 45

gat att cta gtc cag ata ctg atg atg atg gag cca aaa gat gct gtg 192  
 Asp Ile Leu Val Gln Ile Leu Met Met Met Glu Pro Lys Asp Ala Val  
 50 55 60

aaa ttg ggc tta acg tgc aaa gcc tgg aaa tgc gta gct agt ggt aat 240  
 Lys Leu Gly Leu Thr Cys Lys Ala Trp Lys Cys Val Ala Ser Gly Asn  
 65 70 75 80

cgt ctc tgg ata ttt tat ctc cag tgt tct caa gag cca tgg gac tcc 288

Arg	Leu	Trp	Ile	Phe 85	Tyr	Leu	Gln	Cys	Ser 90	Gln	Glu	Pro	Trp	Asp 95	Ser	
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att Ile	tct Ser	agt Ser 115	caa Gln	tca Ser	gga Gly	gag Glu	ttg Leu 120	tcg Ser	ttt Phe	atg Met	cac His	att Ile 125	tat Tyr	agt Ser	cag Gln	384
agg Arg	gca Ala 130	caa Gln	gtt Val	cct Pro	ggc Gly	tct Ser 135	atc Ile	att Ile	att Ile	gat Asp	ggc Gly 140	ggc Gly	tct Ser	gga Gly	tat Tyr	432
tgt Cys 145	aag Lys	ttt Phe	ggc Gly	tgg Trp	agc Ser 150	aag Lys	tat Tyr	gcg Ala	tct Ser	cct Pro 155	tct Ser	gga Gly	cgt Arg	tct Ser	gct Ala 160	480
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caa Gln	cag Gln	ttc Phe	ttt Phe 180	gca Ala	acc Thr	att Ile	ttc Phe 185	acc Thr	agg Arg	atg Met	cag Gln	gta Val	aag Lys 190	ccc Pro	tct Ser	576
atg Met	cag Gln	cca Pro 195	ata Ile	gtg Val	gta Val	tca Ser	cta Leu 200	cct Pro	ctc Leu	tgc Cys	cat His	ttt Phe 205	gat Asp	gat Asp	act Thr	624
gaa Glu	tca Ser 210	gcc Ala	aag Lys	gca Ala	tca Ser	agg Arg 215	cgg Arg	caa Gln	ctt Leu	aag Lys	act Thr 220	gct Ala	att Ile	ttc Phe	aat Asn	672
gtc Val 225	ttg Leu	ttt Phe	gac Asp	atg Met	aac Asn 230	gtc Val	cct Pro	gca Ala	gtg Val	tgt Cys 235	gca Ala	gtt Val	aat Asn	cag Gln	gct Ala 240	720
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acg Thr	ggc Gly 290	ttc Phe	ctt Leu	aag Lys	gag Glu	aag Lys 295	atg Met	caa Gln	gaa Glu	aac Asn	aac Asn 300	att Ile	tcc Ser	ttt Phe	caa Gln	912
tca Ser 305	ctc Leu	tac Tyr	act Thr	gtt Val	cgt Arg 310	act Thr	ctt Leu	aaa Lys	gag Glu	aaa Lys 315	ctg Leu	tgt Cys	tat Tyr	gtg Val	gct Ala 320	960
ctt Leu	gat Asp	tat Tyr	aaa Lys	gct Ala 325	gaa Glu	ctt Leu	tca Ser	aaa Lys	gac Asp 330	aca Thr	caa Gln	gct Ala	tca Ser	gtg Val 335	gaa Glu	1008
gtt Val	tca Ser	ggc Gly	gaa Glu 340	gga Gly	tgg Trp	ttt Phe	act Thr	tta Leu 345	tca Ser	aaa Lys	gag Glu	cgt Arg	ttc Phe 350	caa Gln	aca Thr	1056

ggg gag ata tta ttc caa cca cgt ctc gct gga atg cgt gca atg agt 1104  
 Gly Glu Ile Leu Phe Gln Pro Arg Leu Ala Gly Met Arg Ala Met Ser  
 355 360 365  
 ctg cac cag gcc gtc tcg ctc tgt atg gac cac tgt gat gca gca gga 1152  
 Leu His Gln Ala Val Ser Leu Cys Met Asp His Cys Asp Ala Ala Gly  
 370 375 380  
 ctt aca ggt gac gat agt tgg ttc aag act gta gta cta act ggg gga 1200  
 Leu Thr Gly Asp Asp Ser Trp Phe Lys Thr Val Val Leu Thr Gly Gly  
 385 390 395 400  
 agc gcg tgt ttg cct gga ctc tca gag agg cta gag aga gaa ctg caa 1248  
 Ser Ala Cys Leu Pro Gly Leu Ser Glu Arg Leu Glu Arg Glu Leu Gln  
 405 410 415  
 gat cac ctt cct tca tct ata agt aac gga atc aga gta ata cct cct 1296  
 Asp His Leu Pro Ser Ser Ile Ser Asn Gly Ile Arg Val Ile Pro Pro  
 420 425 430  
 cct tac ggc gtg gac aca tca tgg cat ggg gca aag ctt att agt aat 1344  
 Pro Tyr Gly Val Asp Thr Ser Trp His Gly Ala Lys Leu Ile Ser Asn  
 435 440 445  
 ttg agc atc ttt cct ggt cct tgg tgt atc aca agg aag cag ttc cgt 1392  
 Leu Ser Ile Phe Pro Gly Pro Trp Cys Ile Thr Arg Lys Gln Phe Arg  
 450 455 460  
 cgc aag tca aga ctc atg tgg tga 1416  
 Arg Lys Ser Arg Leu Met Trp  
 465 470

&lt;210&gt; 14

&lt;211&gt; 471

&lt;212&gt; PRT

&lt;213&gt; Arabidopsis thaliana

&lt;400&gt; 14

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 20 25 30  
 Leu Leu Ser Ser Ser Ser Ser Leu Gly Ala Phe Asp Gln Leu Pro Met  
 35 40 45  
 Asp Ile Leu Val Gln Ile Leu Met Met Met Glu Pro Lys Asp Ala Val  
 50 55 60  
 Lys Leu Gly Leu Thr Cys Lys Ala Trp Lys Cys Val Ala Ser Gly Asn  
 65 70 75 80

Arg Leu Trp Ile Phe Tyr Leu Gln Cys Ser Gln Glu Pro Trp Asp Ser  
 85 90 95  
 Ile Phe Phe Ala Glu Thr Ser Leu Arg Ser Gly Tyr Pro Leu Arg Met  
 100 105 110  
 Ile Ser Ser Gln Ser Gly Glu Leu Ser Phe Met His Ile Tyr Ser Gln  
 115 120 125  
 Arg Ala Gln Val Pro Gly Ser Ile Ile Ile Asp Gly Gly Ser Gly Tyr  
 130 135 140  
 Cys Lys Phe Gly Trp Ser Lys Tyr Ala Ser Pro Ser Gly Arg Ser Ala  
 145 150 155 160  
 Thr Phe Leu Glu Phe Gly Asn Ile Glu Ser Pro Ile Tyr Ala Arg Leu  
 165 170 175  
 Gln Gln Phe Phe Ala Thr Ile Phe Thr Arg Met Gln Val Lys Pro Ser  
 180 185 190  
 Met Gln Pro Ile Val Val Ser Leu Pro Leu Cys His Phe Asp Asp Thr  
 195 200 205  
 Glu Ser Ala Lys Ala Ser Arg Arg Gln Leu Lys Thr Ala Ile Phe Asn  
 210 215 220  
 Val Leu Phe Asp Met Asn Val Pro Ala Val Cys Ala Val Asn Gln Ala  
 225 230 235 240  
 Val Leu Ala Leu Tyr Ala Ala Arg Arg Thr Ser Gly Ile Val Val Asn  
 245 250 255  
 Ile Gly Phe Gln Val Ile Thr Ile Leu Pro Ile Leu His Gly Lys Val  
 260 265 270  
 Met Arg Gln Val Gly Val Glu Val Ile Gly Phe Gly Ala Leu Lys Leu  
 275 280 285  
 Thr Gly Phe Leu Lys Glu Lys Met Gln Glu Asn Asn Ile Ser Phe Gln  
 290 295 300  
 Ser Leu Tyr Thr Val Arg Thr Leu Lys Glu Lys Leu Cys Tyr Val Ala  
 305 310 315 320  
 Leu Asp Tyr Lys Ala Glu Leu Ser Lys Asp Thr Gln Ala Ser Val Glu  
 325 330 335  
 Val Ser Gly Glu Gly Trp Phe Thr Leu Ser Lys Glu Arg Phe Gln Thr  
 340 345 350

Gly Glu Ile Leu Phe Gln Pro Arg Leu Ala Gly Met Arg Ala Met Ser  
 355 360 365

Leu His Gln Ala Val Ser Leu Cys Met Asp His Cys Asp Ala Ala Gly  
 370 375 380

Leu Thr Gly Asp Asp Ser Trp Phe Lys Thr Val Val Leu Thr Gly Gly  
 385 390 395 400

Ser Ala Cys Leu Pro Gly Leu Ser Glu Arg Leu Glu Arg Glu Leu Gln  
 405 410 415

Asp His Leu Pro Ser Ser Ile Ser Asn Gly Ile Arg Val Ile Pro Pro  
 420 425 430

Pro Tyr Gly Val Asp Thr Ser Trp His Gly Ala Lys Leu Ile Ser Asn  
 435 440 445

Leu Ser Ile Phe Pro Gly Pro Trp Cys Ile Thr Arg Lys Gln Phe Arg  
 450 455 460

Arg Lys Ser Arg Leu Met Trp  
 465 470

<210> 15

<211> 1092

<212> DNA

<213> Arabidopsis thaliana

<220>

<221> CDS

<222> (1)..(1092)

<223>

<400> 15  
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 1 5 10 15

gca gca att cct gac cag tct cct gca atg ata att ccc tct caa atg 96  
 Ala Ala Ile Pro Asp Gln Ser Pro Ala Met Ile Ile Pro Ser Gln Met  
 20 25 30

aaa cga atg gtt gat gat ggg tct tct tca gct gat aac ccc acc act 144  
 Lys Arg Met Val Asp Asp Gly Ser Ser Ser Ala Asp Asn Pro Thr Thr  
 35 40 45

gtc Val	ttt Phe 50	gag Glu	gat Asp	gtc Val	act Thr	ctt Leu 55	gat Asp	cct Pro	att Ile	gaa Glu	agg Arg 60	ggt Gly	ttg Leu	att Ile	aga Arg	192
gat Asp 65	tgg Trp	gat Asp	gct Ala	atg Met	gaa Glu 70	gat Asp	ctg Leu	ttg Leu	cgt Arg	tat Tyr 75	gtt Val	gtc Val	tac Tyr	act Thr	ggg Gly 80	240
ctt Leu	gga Gly	tgg Trp	gaa Glu	gag Glu 85	gga Gly	aac Asn	gaa Glu	ggc Gly	aat Asn 90	ata Ile	ctt Leu	ttt Phe	aca Thr	gat Asp 95	cca Pro	288
ctt Leu	tgt Cys	act Thr	cct Pro 100	aag Lys	gct Ala	att Ile	agg Arg	gag Glu 105	caa Gln	ttg Leu	gtg Val	cag Gln	ttg Leu 110	atg Met	ttt Phe	336
gaa Glu	aca Thr	ttc Phe 115	aat Asn	gtc Val	tct Ser	gga Gly	ttt Phe 120	tat Tyr	gca Ala	tct Ser	gag Glu	caa Gln 125	gca Ala	gtg Val	ttg Leu	384
tcc Ser	ctt Leu 130	tat Tyr	gct Ala	gtt Val	gga Gly	cgc Arg 135	atc Ile	tcc Ser	ggt Gly	tgc Cys	act Thr 140	gtt Val	gat Asp	att Ile	ggt Gly	432
cat His 145	ggg Gly	aag Lys	ata Ile	gat Asp	att Ile 150	gcc Ala	cca Pro	gtt Val	ctt Leu	gaa Glu 155	ggt Gly	gca Ala	gta Val	caa Gln	cac His 160	480
att Ile	gcc Ala	tcg Ser	aaa Lys	cgg Arg 165	ttt Phe	gag Glu	cta Leu	ggt Gly	gga Gly 170	acc Thr	gag Glu	cta Leu	act Thr	aaa Lys 175	tta Leu	528
ttt Phe	gcc Ala	caa Gln	gag Glu 180	ctt Leu	gga Gly	aaa Lys	acc Thr	aac Asn 185	ccg Pro	tcg Ser	atg Met	aat Asn	ctc Leu 190	agc Ser	atg Met	576
tct Ser	gat Asp	gtt Val 195	gaa Glu	aaa Lys	ctc Leu	aag Lys	gag Glu 200	cag Gln	tat Tyr	gca Ala	aac Asn	tgt Cys 205	gcc Ala	gag Glu	gac Asp	624
gaa Glu	att Ile 210	gct Ala	tac Tyr	aaa Lys	aaa Lys	acc Thr 215	caa Gln	aac Asn	tgt Cys	gaa Glu	atc Ile 220	gag Glu	cag Gln	cat His	act Thr	672
ctt Leu 225	cct Pro	gat Asp	gga Gly	cag Gln	gtg Val 230	ata Ile	agc Ser	atc Ile	ggg Gly	cga Arg 235	gag Glu	aga Arg	tac Tyr	tcg Ser	gtt Val 240	720
gga Gly	gaa Glu	gct Ala	ctg Leu	ttt Phe 245	cag Gln	cca Pro	tca Ser	ata Ile	ctg Leu 250	gga Gly	ctg Leu	gag Glu	gag Glu	cat His 255	gga Gly	768
atc Ile	gtt Val	gag Glu	cag Gln 260	ctt Leu	gtc Val	cgg Arg	att Ile	atc Ile 265	tcc Ser	aca Thr	gtg Val	tca Ser	tct Ser 270	gag Glu	aac Asn	816
cat His	agg Arg	cag Gln 275	ctc Leu	ttg Leu	gag Glu	aac Asn	act Thr 280	gta Val	ctt Leu	tgt Cys	ggt Gly	ggt Gly 285	aca Thr	acc Thr	tcc Ser	864
atg Met	aca Thr 290	gga Gly	ttc Phe	gaa Glu	agt Ser	aga Arg 295	ttc Phe	cag Gln	aaa Lys	gaa Glu	gca Ala 300	aac Asn	ttg Leu	tgc Cys	tca Ser	912
tct	gcc	att	agg	cca	aca	ctg	gtg	aaa	ccg	cca	gaa	tat	atg	ccg	gag	960

Ser Ala Ile Arg Pro Thr Leu Val Lys Pro Pro Glu Tyr Met Pro Glu  
 305 310 315 320  
 aat ttg ggg atg tat tcg gct tgg gtt gga gga gcc ata cta gct aaa 1008  
 Asn Leu Gly Met Tyr Ser Ala Trp Val Gly Gly Ala Ile Leu Ala Lys  
 325 330 335  
 gtg gtg ttt ccg cag aat cag cac gtt act aaa gca gat tat gac gag 1056  
 Val Val Phe Pro Gln Asn Gln His Val Thr Lys Ala Asp Tyr Asp Glu  
 340 345 350  
 act gga cca tca gtg gtt cac agg aaa tgt ttc tga 1092  
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<210> 16

<211> 363

<212> PRT

<213> Arabidopsis thaliana

<400> 16

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 Lys Arg Met Val Asp Asp Gly Ser Ser Ser Ala Asp Asn Pro Thr Thr  
 35 40 45  
 Val Phe Glu Asp Val Thr Leu Asp Pro Ile Glu Arg Gly Leu Ile Arg  
 50 55 60  
 Asp Trp Asp Ala Met Glu Asp Leu Leu Arg Tyr Val Val Tyr Thr Gly  
 65 70 75 80  
 Leu Gly Trp Glu Glu Gly Asn Glu Gly Asn Ile Leu Phe Thr Asp Pro  
 85 90 95  
 Leu Cys Thr Pro Lys Ala Ile Arg Glu Gln Leu Val Gln Leu Met Phe  
 100 105 110  
 Glu Thr Phe Asn Val Ser Gly Phe Tyr Ala Ser Glu Gln Ala Val Leu  
 115 120 125  
 Ser Leu Tyr Ala Val Gly Arg Ile Ser Gly Cys Thr Val Asp Ile Gly  
 130 135 140  
 His Gly Lys Ile Asp Ile Ala Pro Val Leu Glu Gly Ala Val Gln His  
 145 150 155 160



Ile Ala Ser Lys Arg Phe Glu Leu Gly Gly Thr Glu Leu Thr Lys Leu  
 165 170 175

Phe Ala Gln Glu Leu Gly Lys Thr Asn Pro Ser Met Asn Leu Ser Met  
 180 185 190

Ser Asp Val Glu Lys Leu Lys Glu Gln Tyr Ala Asn Cys Ala Glu Asp  
 195 200 205

Glu Ile Ala Tyr Lys Lys Thr Gln Asn Cys Glu Ile Glu Gln His Thr  
 210 215 220

Leu Pro Asp Gly Gln Val Ile Ser Ile Gly Arg Glu Arg Tyr Ser Val  
 225 230 235 240

Gly Glu Ala Leu Phe Gln Pro Ser Ile Leu Gly Leu Glu Glu His Gly  
 245 250 255

Ile Val Glu Gln Leu Val Arg Ile Ile Ser Thr Val Ser Ser Glu Asn  
 260 265 270

His Arg Gln Leu Leu Glu Asn Thr Val Leu Cys Gly Gly Thr Thr Ser  
 275 280 285

Met Thr Gly Phe Glu Ser Arg Phe Gln Lys Glu Ala Asn Leu Cys Ser  
 290 295 300

Ser Ala Ile Arg Pro Thr Leu Val Lys Pro Pro Glu Tyr Met Pro Glu  
 305 310 315 320

Asn Leu Gly Met Tyr Ser Ala Trp Val Gly Gly Ala Ile Leu Ala Lys  
 325 330 335

Val Val Phe Pro Gln Asn Gln His Val Thr Lys Ala Asp Tyr Asp Glu  
 340 345 350

Thr Gly Pro Ser Val Val His Arg Lys Cys Phe  
 355 360

<210> 17

<211> 1791

<212> DNA

<213> Arabidopsis thaliana

<220>

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&lt;222&gt; (1)..(1791)

&lt;223&gt;

&lt;400&gt; 17

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Met Ala Lys Pro Lys Ser Asn Ser His Leu Ser Trp Gln Asp Tyr Leu	
1 5 10 15	
aaa act gtt gcc ccc act cag att ttg tct gaa cga gga gct aat ctc	96
Lys Thr Val Ala Pro Thr Gln Ile Leu Ser Glu Arg Gly Ala Asn Leu	
20 25 30	
gtt gtc atc aac tta ggg tct gct aat gta aga gta gga ttg gct atg	144
Val Val Ile Asn Leu Gly Ser Ala Asn Val Arg Val Gly Leu Ala Met	
35 40 45	
gat gag aaa cct ttc aat gtt cct aat tgt att gca aga tac att aca	192
Asp Glu Lys Pro Phe Asn Val Pro Asn Cys Ile Ala Arg Tyr Ile Thr	
50 55 60	
caa tct ggg aaa cca act gtt gtt gat cag atg ctt aac act gag gtc	240
Gln Ser Gly Lys Pro Thr Val Val Asp Gln Met Leu Asn Thr Glu Val	
65 70 75 80	
act act aat caa cat gtt gac cgt gag aga gct tat aat tct gcg gca	288
Thr Thr Asn Gln His Val Asp Arg Glu Arg Ala Tyr Asn Ser Ala Ala	
85 90 95	
tcg ctg ttg aag ata ctg ttc ctg gat gaa agt tct tct tct ggc tct	336
Ser Leu Leu Lys Ile Leu Phe Leu Asp Glu Ser Ser Ser Ser Gly Ser	
100 105 110	
gca tct cgc aag atg ggg agg atc gac gga tac aat caa gcg agt acg	384
Ala Ser Arg Lys Met Gly Arg Ile Asp Gly Tyr Asn Gln Ala Ser Thr	
115 120 125	
ata aag aaa gat tca gtc ttt act tgg act gat gtg tat gag gat gag	432
Ile Lys Lys Asp Ser Val Phe Thr Trp Thr Asp Val Tyr Glu Asp Glu	
130 135 140	
aaa att tct ctt gcc tca cca gca gaa act tct cct gat aaa ggt gat	480
Lys Ile Ser Leu Ala Ser Pro Ala Glu Thr Ser Pro Asp Lys Gly Asp	
145 150 155 160	
gct agt gca tct gaa gct gtt cct gat gtt act gac tct aaa gat act	528
Ala Ser Ala Ser Glu Ala Val Pro Asp Val Thr Asp Ser Lys Asp Thr	
165 170 175	
agt gag agt aaa cgc aag tat agg aaa atg att ttt ggt gaa gaa gct	576
Ser Glu Ser Lys Arg Lys Tyr Arg Lys Met Ile Phe Gly Glu Glu Ala	
180 185 190	
ttg aaa ata tcg cca aaa gag cca tat tgt tta tac cat cct att cgg	624
Leu Lys Ile Ser Pro Lys Glu Pro Tyr Cys Leu Tyr His Pro Ile Arg	
195 200 205	
aga ggt cac ttc aat gtt tcg cca cat tat tca gcg caa cgg gtt tgt	672
Arg Gly His Phe Asn Val Ser Pro His Tyr Ser Ala Gln Arg Val Cys	
210 215 220	
gag gac tta act gct atc ttg gac tgg att tta tta gag aaa ctt cat	720

Glu 225	Asp	Leu	Thr	Ala	Ile 230	Leu	Asp	Trp	Ile	Leu 235	Leu	Glu	Lys	Leu	His 240	
ata Ile	act Thr	cac His	aag Lys	gag Glu 245	aga Arg	ttc Phe	tct Ser	ttt Phe	cat His 250	gct Ala	gtt Val	att Ile	gtt Val	gtc Val 255	cca Pro	768
gaa Glu	aca Thr	ttt Phe	gac Asp 260	acc Thr	cgc Arg	gaa Glu	ata Ile	aag Lys 265	gaa Glu	atg Met	cta Leu	act Thr	att Ile 270	gtg Val	ttg Leu	816
gga Gly	gag Glu	cta Leu 275	tac Tyr	ttt Phe	aac Asn	tca Ser	gca Ala 280	gtt Val	gtc Val	cac His	caa Gln	gaa Glu 285	ggg Gly	cta Leu	tcg Ser	864
gcc Ala	gtt Val 290	ttt Phe	ggg Gly	aat Asn	ggg Gly	ttg Leu 295	aca Thr	aca Thr	gct Ala	tgt Cys	att Ile 300	gtg Val	aat Asn	ata Ile	gga Gly	912
gcc Ala 305	cag Gln	aca Thr	agt Ser	aca Thr	gta Val 310	gtt Val	tgt Cys	gtc Val	gag Glu	gat Asp 315	ggg Gly	gtc Val	tca Ser	ttg Leu	cca Pro 320	960
aat Asn	act Thr	gaa Glu	aag Lys	att Ile 325	tta Leu	cct Pro	ttt Phe	gga Gly	gga Gly 330	gag Glu	gat Asp	ata Ile	tgt Cys	aga Arg 335	tgc Cys	1008
ctt Leu	cta Leu	tgg Trp	att Ile 340	cag Gln	agg Arg	cat His	tac Tyr	caa Gln 345	aag Lys	tgg Trp	cca Pro	caa Gln	atc Ile 350	aac Asn	aca Thr	1056
gat Asp	gtt Val	ttg Leu 355	gca Ala	aag Lys	cca Pro	atc Ile	gat Asp 360	atg Met	ctg Leu	atg Met	ctt Leu	aat Asn 365	caa Gln	ctt Leu	aag Lys	1104
gag Glu	tca Ser 370	ttt Phe	tgt Cys	gaa Glu	att Ile	aga Arg 375	gca Ala	gga Gly	gaa Glu	ctt Leu	gaa Glu 380	act Thr	gtt Val	gca Ala	acg Thr	1152
gtt Val 385	cat His	tct Ser	tat Tyr	gag Glu	gaa Glu 390	ggc Gly	atg Met	cca Pro	gct Ala	gtg Val 395	cct Pro	cac His	aag Lys	aca Thr	aat Asn 400	1200
ctc Leu	acc Thr	tcc Ser	ctt Leu	aac Asn 405	gtt Val	cca Pro	cca Pro	atg Met	ggg Gly 410	ctg Leu	ttt Phe	tat Tyr	cct Pro	aac Asn 415	ctt Leu	1248
ttg Leu	gtc Val	cct Pro	gaa Glu 420	ata Ile	ttt Phe	ccc Pro	cag Gln	cca Pro 425	cca Pro	cgt Arg	caa Gln	tgg Trp	ttt Phe 430	caa Gln	gac Asp	1296
tac Tyr	gag Glu	aat Asn 435	atg Met	ttg Leu	gaa Glu	gac Asp	act Thr 440	tgg Trp	aac Asn	atg Met	gac Asp	ttt Phe 445	gga Gly	ggg Gly	ggg Gly	1344
ggg Gly	aac Asn 450	atg Met	gga Gly	tta Leu	cca Pro	atg Met 455	tgg Trp	gat Asp	agt Ser	ttt Phe	gca Ala 460	ttt Phe	tcg Ser	cct Pro	tca Ser	1392
aaa Lys 465	cca Pro	aag Lys	aaa Lys	gaa Glu	gag Glu 470	aag Lys	att Ile	ggg Gly	ctc Leu	gct Ala 475	gaa Glu	gcc Ala	att Ile	aca Thr	agc Ser 480	1440
agc Ser	att Ile	ctc Leu	tct Ser	gct Ala 485	gga Gly	cgc Arg	ata Ile	gac Asp	ctt Leu 490	aga Arg	cgg Arg	aag Lys	ctt Leu	ttc Phe 495	tcc Ser	1488

agc att caa ttg att ggt ggt gct ggt ttg acg aaa ggt ctt gta gcg 1536  
 Ser Ile Gln Leu Ile Gly Gly Ala Gly Leu Thr Lys Gly Leu Val Ala  
 500 505 510  
 gca gtg gaa gaa aga gtt ctt cac gcg ata cct cca act gaa gcc att 1584  
 Ala Val Glu Glu Arg Val Leu His Ala Ile Pro Pro Thr Glu Ala Ile  
 515 520 525  
 gat aca gtg cag gtt ctg cca tca aga acg gag cca caa ttc gta act 1632  
 Asp Thr Val Gln Val Leu Pro Ser Arg Thr Glu Pro Gln Phe Val Thr  
 530 535 540  
 tgg aaa gga gga gcg ata ttg gga att ctg gac ttt ggg agg gag gct 1680  
 Trp Lys Gly Gly Ala Ile Leu Gly Ile Leu Asp Phe Gly Arg Glu Ala  
 545 550 555 560  
 tgg att gag aga cat caa tgg atg gta aat ggg gtt aat aaa ggt ggt 1728  
 Trp Ile Glu Arg His Gln Trp Met Val Asn Gly Val Asn Lys Gly Gly  
 565 570 575  
 cta aag aag tac aaa gac tct tat cac ctt caa ggt caa gca atg tac 1776  
 Leu Lys Lys Tyr Lys Asp Ser Tyr His Leu Gln Gly Gln Ala Met Tyr  
 580 590  
 ttc atc aac ccc tag 1791  
 Phe Ile Asn Pro  
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&lt;210&gt; 18

&lt;211&gt; 596

&lt;212&gt; PRT

&lt;213&gt; Arabidopsis thaliana

&lt;400&gt; 18

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 Lys Thr Val Ala Pro Thr Gln Ile Leu Ser Glu Arg Gly Ala Asn Leu  
 20 25 30  
 Val Val Ile Asn Leu Gly Ser Ala Asn Val Arg Val Gly Leu Ala Met  
 35 40 45  
 Asp Glu Lys Pro Phe Asn Val Pro Asn Cys Ile Ala Arg Tyr Ile Thr  
 50 55 60  
 Gln Ser Gly Lys Pro Thr Val Val Asp Gln Met Leu Asn Thr Glu Val  
 65 70 75 80  
 Thr Thr Asn Gln His Val Asp Arg Glu Arg Ala Tyr Asn Ser Ala Ala  
 85 90 95

Ser Leu Leu Lys Ile Leu Phe Leu Asp Glu Ser Ser Ser Ser Gly Ser  
 100 105 110  
 Ala Ser Arg Lys Met Gly Arg Ile Asp Gly Tyr Asn Gln Ala Ser Thr  
 115 120 125  
 Ile Lys Lys Asp Ser Val Phe Thr Trp Thr Asp Val Tyr Glu Asp Glu  
 130 135 140  
 Lys Ile Ser Leu Ala Ser Pro Ala Glu Thr Ser Pro Asp Lys Gly Asp  
 145 150 155 160  
 Ala Ser Ala Ser Glu Ala Val Pro Asp Val Thr Asp Ser Lys Asp Thr  
 165 170 175  
 Ser Glu Ser Lys Arg Lys Tyr Arg Lys Met Ile Phe Gly Glu Glu Ala  
 180 185 190  
 Leu Lys Ile Ser Pro Lys Glu Pro Tyr Cys Leu Tyr His Pro Ile Arg  
 195 200 205  
 Arg Gly His Phe Asn Val Ser Pro His Tyr Ser Ala Gln Arg Val Cys  
 210 215 220  
 Glu Asp Leu Thr Ala Ile Leu Asp Trp Ile Leu Leu Glu Lys Leu His  
 225 230 235 240  
 Ile Thr His Lys Glu Arg Phe Ser Phe His Ala Val Ile Val Val Pro  
 245 250 255  
 Glu Thr Phe Asp Thr Arg Glu Ile Lys Glu Met Leu Thr Ile Val Leu  
 260 265 270  
 Gly Glu Leu Tyr Phe Asn Ser Ala Val Val His Gln Glu Gly Leu Ser  
 275 280 285  
 Ala Val Phe Gly Asn Gly Leu Thr Thr Ala Cys Ile Val Asn Ile Gly  
 290 295 300  
 Ala Gln Thr Ser Thr Val Val Cys Val Glu Asp Gly Val Ser Leu Pro  
 305 310 315 320  
 Asn Thr Glu Lys Ile Leu Pro Phe Gly Gly Glu Asp Ile Cys Arg Cys  
 325 330 335  
 Leu Leu Trp Ile Gln Arg His Tyr Gln Lys Trp Pro Gln Ile Asn Thr  
 340 345 350  
 Asp Val Leu Ala Lys Pro Ile Asp Met Leu Met Leu Asn Gln Leu Lys  
 355 360 365

Glu Ser Phe Cys Glu Ile Arg Ala Gly Glu Leu Glu Thr Val Ala Thr  
 370 375 380

Val His Ser Tyr Glu Glu Gly Met Pro Ala Val Pro His Lys Thr Asn  
 385 390 395 400

Leu Thr Ser Leu Asn Val Pro Pro Met Gly Leu Phe Tyr Pro Asn Leu  
 405 410 415

Leu Val Pro Glu Ile Phe Pro Gln Pro Pro Arg Gln Trp Phe Gln Asp  
 420 425 430

Tyr Glu Asn Met Leu Glu Asp Thr Trp Asn Met Asp Phe Gly Gly Gly  
 435 440 445

Gly Asn Met Gly Leu Pro Met Trp Asp Ser Phe Ala Phe Ser Pro Ser  
 450 455 460

Lys Pro Lys Lys Glu Glu Lys Ile Gly Leu Ala Glu Ala Ile Thr Ser  
 465 470 475 480

Ser Ile Leu Ser Ala Gly Arg Ile Asp Leu Arg Arg Lys Leu Phe Ser  
 485 490 495

Ser Ile Gln Leu Ile Gly Gly Ala Gly Leu Thr Lys Gly Leu Val Ala  
 500 505 510

Ala Val Glu Glu Arg Val Leu His Ala Ile Pro Pro Thr Glu Ala Ile  
 515 520 525

Asp Thr Val Gln Val Leu Pro Ser Arg Thr Glu Pro Gln Phe Val Thr  
 530 535 540

Trp Lys Gly Gly Ala Ile Leu Gly Ile Leu Asp Phe Gly Arg Glu Ala  
 545 550 555 560

Trp Ile Glu Arg His Gln Trp Met Val Asn Gly Val Asn Lys Gly Gly  
 565 570 575

Leu Lys Lys Tyr Lys Asp Ser Tyr His Leu Gln Gly Gln Ala Met Tyr  
 580 585 590

Phe Ile Asn Pro  
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<400> 19

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29

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<400> 20

ctcgtatgta tcccccttct cc

22

<210> 21

<211> 21

<212> DNA

<213> Arabidopsis thaliana

<400> 21

tgatggatct atcaccatca g

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<400> 22

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21

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<400> 23

tgatggatct atcaccatca g

21

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<400> 24  
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<210> 25  
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<400> 25  
tttgatgggc caaatgatg 19

<210> 26  
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<400> 26  
cttccaacct aggtgagatg tttcaacaaa atgtgc 36

<210> 27  
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<400> 27  
tcaacagcag gacacaagg 19

<210> 28  
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cccaatgcct aggaaatccg agttcaacat cctaatc

37

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23

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aacaagtact cgctctcatg ctc

23